OPEN ACCESS Freely available online

ISSN: 2315-7844
Review of Public Administration and Management

Short Communication

A Reflection of China's 5G and Supercomputing Developments

Mengyu Han*

Department of Public Policy, University of California, Berkeley, California, United States of America

ABSTRACT

The strategic importance of the Chinese 5G and Supercomputing Industries necessitates an examination of their development trajectories. Yuhan Zhang provides a significant insight into the role of central government policies in shaping industry development outcomes. Using various analytical methods, the author contends that the Chinese government's industrial policies contributed to the divergent outcomes of the 5G and supercomputing industries prior to U.S. sanctions in 2019: an unbalanced 5G industry and an appropriately designed supercomputing industry. While I express reservations about heavy government investment in industry developments, as the author proposes, this article contributes to the ongoing conversation of how China might recalibrate industrial policies to restore balance in the 5G industry and reflect upon the successes of supercomputing policies for future guidance.

Keywords: 5G; Industrial policy; Supercomputing; Chinese government

DESCRIPTION

The technological competition between countries underscores the growing strategic importance of industries such as AI, 5G, and supercomputing. Existing literature focuses mostly on examining the future direction and application of artificial intelligence technology, with around 334,497 AI-related publications in 2021 [1]. The field of 5G and supercomputing remains relatively underexplored, with around 10,672 articles between 2005 and 2020 for 5G and 795 papers on supercomputing in 2022 [2]. While current conversation lauds China's success in 5G base expansion and supercomputer and traditional belief states industrial policies spur industry growth [3]. The author highlights the vulnerabilities that exist within the 5G industry compared to supercomputing and argue the result of such divergent outcome is due to unbalanced 5G industrial policy designs. In comparison, the well-designed supercomputing industrial policies allowed China's possession of entirely homegrown supercomputers [4].

The first section deliberates on the rationale behind investigating the disparities in industrial policies governing these two industries and their implications for policy debates. For commonalities, both encompass upstream, midstream, and downstream segments, have a dual-use nature, are of strategic national security importance for the Chinese government, could connect and interoperate with foreign countries, and face embargos from the U.S. Department of Commerce regarding upstream technological investments [5]. The analysis examines the role of industrial policy in industry development with machine learning and qualitative content analysis and contradicts the conventional understanding that industrial policy can promote the development of specific industries.

The author used different methods of analysis to examine 5G and supercomputing industrial policies. For 5G industrial policy, the author deployed Natural Language Processing (NLP) to analyze official documents and identify keywords related to the different segments of 5G. For supercomputing policies, apart from using NLP, the author also drew from secondary sources to complement the absence of official documents. Textual and numerical data sourced from company reports, industry news, historical books, and academic papers were then subjected to qualitative content analysis and descriptive data interpretation to identify the relationship between policy design and industry development [6]. A systemic approach was further employed to unveil the underlying factors influencing divergent policy designs, focusing on the role of top Chinese leadership, state interests and domestic economy, and systemic dynamics that influenced state behavior.

Correspondence to: Mengyu Han, Department of Public Policy, University of California, Berkeley, California, United States of America, E-mail: mengyu-han@berkeley.edu

Received: 10-Nov-2023, Manuscript No. RPAM-23-23877; **Editor assigned:** 13-Nov-2023, PreQC No. RPAM-23-23877 (PQ); **Reviewed:** 27-Nov-2023, QC No. RPAM-23-23877; **Revised:** 04-Dec-2023, Manuscript No. RPAM-23-23877 (R); **Published:** 11-Dec-2023, DOI: 10.35248/2315-7844.23.11.429

Citation: Han M (2023) A Reflection of China's 5G and Supercomputing Developments. Review Pub Administration Manag.11:429.

The author's findings challenge the conventional understanding of China's 5G development and provide insights into the success of the Chinese supercomputing industry. Analysis of 5G industrial policies from 2015 to 2019 shows that prior to U.S. sanctions, keywords related to midstream and downstream segments, such as "commercial application," "standard," and "industrialization," appeared in all 12 official documents analyzed, whereas words related to upstream segments, like "5G chips" and "5G parts" only appeared around 33.3%. Further, the government's emphasis on the midstream and downstream segments reduced company incentives to develop upstream parts, given an established reliance on foreign suppliers prior to sanctions and the riskier nature of R&D [7]. This unbalanced attention resulted in the mobilization of capital and resources to the infrastructure and application segments.

The supercomputing industrial policy faced a different story. The author's secondary sources analysis shows that the 863 program in the 1980s substantially propelled the development of Chinese supercomputing by building an expert system and restricting access to capable actors. In the early 2000s and 2010s, China's national technological development programs emphasized keywords like "research," "intellectual property rights," "essential parts," "software innovation," and "integrated circuits," accelerating the advancement of the entire industrial chain with breakthroughs in core devices.

The author concludes the article with the policy rationale behind the divergent designs and implications for the future. The loop-sided 5G policy design could be attributed to a need to maintain party legitimacy and economic growth. Midstream and downstream segments stimulate the economy through infrastructure spending and domestic consumption, while upstream segments demand more investment and risk failure. The author notes that China's 5G commercial license was granted shortly before the sanctions, making it hard for the government to design timely policies to address the imbalance. Companies lacked incentive to innovate, given access to foreign entities before the sanctions [8]. However, the author mentions that in 2021, the 5G policy started to shift to emphasize upstream components as the government realized the national security implications and stressed the need to strengthen technical capabilities. For the current advancements in supercomputing, Deng Xiaoping could be credited for his decisiveness to initiate the 863 program, which boosted Chinese supercomputing development in a time of hostile international environment and domestic impetus during the Cold War era.

The policy implication from the author's analysis suggests industrial policies do not necessarily boost industry development. In the case of 5G, it misallocated resources and distorted the development of the industry, rendering it susceptible to U.S. sanctions in 2019. As these industries become more strategically important for national security, the author underscores the imperative need for industrial policy to develop entire industrial chains instead of specific segments. The article warns about the vulnerability of the 5G industry to further sanctions amidst the current wave of protectionism. To fortify the industry, the author suggests reducing reliance on market forces and directing the government's vast resources toward overall balanced industrial development.

The article critically examines how policy designs have contributed to divergent development outcomes of the 5G and supercomputing industries. While the author stresses the need for the government to invest its resources to develop the 5G industry, I voice caution on heavy government investment as it may marginalize participation from interest parties, as mentioned in my working paper for UC Berkeley. Zhang mentioned the government should utilize national laboratories and state-endorsed universities, establish accountability mechanisms, and bring in capable companies for technical collaborations. Undoubtedly, Chinese national laboratories and research universities serve as great resources to boost innovation, yet the government might scrutinize the selection of capable companies for ideological reasoning's and a need to maintain party legitimacy [9]. This might inadvertently sideline capable actors with vital resources to develop the industries.

REFERENCES

1. Chen S. China built more 5G base stations in 3 months than US did in 2 years. 2023
2. Han M. Chinese 5G Development and Foreign Investment. 2023.
3. Mendonça S, Damásio B, de Freitas LC, Oliveira L, Cichy M, Nicita A. The rise of 5G technologies and systems: A quantitative analysis of knowledge production. Telecomm Policy. 2022;46(4): 102327.
4. Oh SY. China's race to the top: Regional and global implications of China's industrial. World Trade Review (Forthcoming). 2020.
5. Clark J, Perrault R. Artificial Intelligence Index. 2022.
6. Triolo P. China's 5G strategies: be first out of the gate and ready to innovate. 2020:21-8.
7. Xin L. US guru says China's supercomputer power may exceed all countries but flies under the radar because of sanctions. 2023.
8. Zhang Y. China's 5G and supercomputing industrial policies: A critical (comparative) analysis. Glob Policy. 2023.
9. Zhao Q, Li Z, Zhao Z, Ma J. Industrial policy and innovation capability of strategic emerging industries: Empirical evidence from chinese new energy vehicle industry. Sustainability. 2019;11(10):2785.